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EXAMINER	
WILKINS III, HARRY D	
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11

Please find below and/or attached an Office communication concerning this application or proceeding.

C2011

Office Action Summary	Application No.	Applicant(s)	
	09/930,172	TANAKA ET AL.	
	Examiner	Art Unit	
	Harry D Wilkins, III	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 September 2003 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-7 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 16 A$ugust 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Claims 1-7 are pending.

2. The rejection under 35 USC 103 based on Murakami et al in view of Ochi et al has been withdrawn in view of Applicant's amendment of the claims (see Table 3, which shows a bearing where each of the rings and the rolling elements are made from the same composition is cited as a comparison example).

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 August 2003 has been entered.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda (US 6,197,128) in view of Ochi et al (EP 0933440).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art

under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Maeda teaches (see abstract) a rolling bearing component with a rolling bearing ring and a rolling element made from a composition as below. Maeda teaches (see abstract) that *at least one of* the rolling element and bearing ring are made from the composition. Therefore, Maeda teaches making the rings and the rolling elements from the composition.

However, Maeda is silent about the contents of P, S, Al, Ti, O and N.

Ochi et al teach a similar case hardening steel (i.e.-same field of endeavor) that teaches limiting each of these elements to certain ranges. Ochi et al teach (see paragraphs 20, 21, 23, 29, 30 and 31) that P should be maintained at less than 0.025 wt% to avoid degrading properties of case hardening steels, S should be kept at 0.001-0.01 wt% (desirable) to maintain machinability without segregation of MnS, Al should be added at 0.015-0.04 wt% to insure effective grain growth suppression, Ti should be kept below 0.0025 wt% (desirable) to avoid a reduction in the suppression of grain growth, O should be kept below 0.0012 wt% (desirable) to avoid an increase in oxides which cause rolling fatigue failure and N should be added at 0.006-0.020 wt% to achieve grain refinement.

Therefore, it would have been obvious to one of ordinary skill in the art to have limited the elements P, S, Al, Ti, O and N to the ranges taught by Ochi et al in the steel

of Maeda because of the reasons for maintaining these elements at the disclosed levels provided for by Ochi et al in paragraphs 20, 21, 23, 29, 30 and 31.

	Claimed	Maeda in view Of Ochi et al	Overlap
C	0.1-0.4 wt%	0.3-0.6 wt%	At 0.3-0.4 wt%
Si	0.3-3.0 wt%	0.1-0.35 wt%	At 0.3-0.35 wt%
Mn	0.2-2.0 wt%	1.1-1.5 wt%	At 1.1-1.5 wt%
P	<0.03 wt%	<0.025 wt%	At <0.025 wt%
S	<0.03 wt%	0.001-0.01 wt%	At 0.001-0.01 wt%
Cr	0.3-2.5 wt%	0.5-2.0 wt%	At 0.5-2.0 wt%
Ni	0.1-2.0 wt%	0.2-0.6 wt%	At 0.2-0.6 wt%
Al	<0.05 wt%	0.015-0.04 wt%	At 0.015-0.04 wt%
Ti	<0.003 wt%	<0.0025 wt%	At <0.0025 wt%
O	<0.0015 wt%	<0.0012 wt%	At <0.0012 wt%
N	<0.025 wt%	0.006-0.020 wt%	At 0.006-0.020 wt%

Maeda teaches (see col 4, lines 5-11, col 6, lines 44-49, col 7, lines 38-45 and Table 5) that the steel is subjected to carburizing or carbonitriding and then subjected to tempering at a temperature of at least 230°C. Though there is no express disclosure of a quenching process after the carburizing/carbonitriding step, the process would have been expected to contain such a step as quenching after carburizing/carbonitriding was conventional in the art to cool the bearing to a temperature at which it could be handled for further processing and for providing hardening of the alloy. For support of conventional quenching, see Murakami et al at fig. 2(a). The example in Table 5 of Maeda was tempered at 230°C has a surface hardness of 745 Hv, which is about HRC60.

Regarding the process limitation of high temperature tempering at 250-350°C, the claim is a product-by-process claim and any art that discloses the same product teaches the claim, even if made by a materially different process.

Regarding the presence of Mo in the steel of Maeda, the present claim recites a composition "containing" certain elements. This language is interpreted to mean that the composition is open to additional elements, even in major amounts.

Regarding claim 2, Maeda teaches (see abstract) that the steel may contain 0.15-0.5 wt% Mo. Maeda does not teach adding V. Ochi et al teach (see paragraph no. 28) that V is added at 0.03-0.5 wt% for adding strength and hardenability to case hardening steels. Therefore, it would have been obvious to one of ordinary skill in the art to have added 0.03-0.5 wt% V as taught by Ochi et al to the case hardening steel of Maeda because Ochi et al teach that V adds strength and hardenability to the steel.

Regarding claim 3, the range of Mn+Ni taught by Maeda is 1.3-2.1 wt%. Thus, Maeda teaches an overlapping range for Mn+Ni at 1.5-2.1 wt%.

Regarding claim 4, Maeda teaches a method, as above, including starting with a steel material having a composition as claimed (when taken in view of Ochi et al), performing carburizing and/or carbonitriding followed by quenching, and finally tempering at 230°C. Thus, Maeda teaches the method substantially as claimed. Maeda does not meet the claimed range of the tempering temperature. However, the value disclosed by Maeda is close enough to the presently claimed range that one of ordinary skill in the art would have expected that the two processes would produce similar results. If the range of the prior art and claimed range do not overlap, obviousness may still exist if the ranges are close enough that one would not expect a difference in properties. *In re Woodruff* 16 USPQ 2d 1934; *Titanium Metals Corp. v.*

Banner 227 USPQ 773 (Fed. Cir. 1985); *In re Aller* 105 USPQ 233 and MPEP 2144.05 I.

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda (US 6,197,128) in view of Ochi et al (EP 0933440) as applied to claims 1-4 above, and further in view of Maruta et al (US 4,885,905).

The teachings of Maeda in view of Ochi et al are described above in paragraph no. 5.

Maeda does not teach applying a secondary quenching step between the carburizing step and the tempering step.

Maruta et al teach (see col. 3, lines 59-64) applying secondary quenching to a bearing steel to increase hardness and improve abrasion resistance.

Therefore, it would have been obvious to one of ordinary skill to have performed a secondary quenching step before the tempering process in order to ensure proper hardness and to improve abrasion resistance.

Regarding claim 6, Maeda is silent on the secondary quenching. Though Maruta et al do not expressly teach that the secondary quenching is preceded by intermediate annealing, Maruta et al teach (see col. 3, lines 59-64) that the steel is quenched from 840°C. Thus, heating to 840°C would precede the quenching. This heating to 840°C would constitute intermediate annealing. Therefore, it would have been obvious to one of ordinary skill in the art to have performed intermediate annealing on the steel of Maeda because Maruta et al teach that the secondary quenching, which is preceded by the intermediate annealing, improves hardness and abrasion resistance.

Regarding claim 7, the range of Mn+Ni taught by Maeda is 1.3-2.1 wt%. Thus, Maeda teaches an overlapping range for Mn+Ni at 1.5-2.1 wt%.

7. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al (5,595,610) in view of Ochi et al (EP 09334440) and Mitamura (GB 2,235,698).

Maeda et al teach (see claims 1 and 6) a case hardening steel that has a composition which overlaps the presently claimed composition ranges.

However, Maeda et al are silent regarding the contents of P, Ti and O in the compostion.

Ochi et al teach a similar case hardening steel (i.e.-same field of endeavor) that teaches limiting each of these elements to certain ranges. Ochi et al teach (see paragraphs 29, 30 and 31) that P should be maintained at less than 0.025 wt% to avoid degrading properties of case hardening steels, Ti should be kept below 0.0025 wt% (desirable) to avoid a reduction in the suppression of grain growth and O should be kept below 0.0012 wt% (desirable) to avoid an increase in oxides which cause rolling fatigue failure.

Therefore, it would have been obvious to one of ordinary skill in the art to have limited the elements P, Ti and O to the ranges taught by Ochi et al in the steel of Maeda because of the reasons for maintaining these elements at the disclosed levels provided for by Ochi et al in paragraphs 29, 30 and 31.

	Claimed	Maeda et al in View of Ochi et al	Overlap
C	0.1-0.4 wt%	0.03-0.27 wt%	At 0.1-0.27 wt%
Si	0.3-3.0 wt%	0.05-0.35 wt%	At 0.3-0.35 wt%
Mn	0.2-2.0 wt%	0.3-2.0 wt%	At 0.3-2.0 wt%
P	<0.03 wt%	<0.025 wt%	At <0.025 wt%
S	<0.03 wt%	<0.03 wt%*	At <0.03 wt%
Cr	0.3-2.5 wt%	0.03-1.5 wt%	At 0.3-1.5 wt%
Ni	0.1-2.0 wt%	0.4-3.0 wt%	At 0.4-2.0 wt%
Al	<0.05 wt%	0.015-0.1 wt%	At 0.015-0.05 wt%
Ti	<0.003 wt%	<0.0025 wt%	At <0.0025 wt%
O	<0.0015 wt%	<0.0012 wt%	At <0.0012 wt%
N	<0.025 wt%	0.004-0.02 wt%	At 0.004-0.02 wt%
Mo	0.05-2.5 wt%	0.1-1.0 wt%	At 0.1-1.0 wt%
V	0.05-1.0 wt%	0.03-0.5 wt%	At 0.05-0.5 wt%

*The claim contains a typographical error, it should be <0.03 wt% as per col 2, line 30.

Maeda et al teach (see claim 1) that the method of production includes carburizing and/or carbonitriding followed by quenching. The process also includes (see Figures 3 and 4) tempering, but at a temperature of 170°C.

The differences between the invention of Maeda et al in view of Ochi et al and the present invention are that (1) Maeda et al do not teach that the tempering step occurs at temperatures of 250-350°C and (2) Maeda et al do not teach that the steel is made into a rolling bearing component having each of an inner ring, an outer ring and a rolling element made from the steel.

Mitamura teaches (see last 2 paragraphs on page 6 and 1st paragraph on page 7) a rolling bearing constituted of a bearing ring and a rolling element made from a steel with a composition similar to the steel of Maeda et al and that *at least one of* the races and rolling element is made from the steel. Thus, Mitamura teaches making a rolling bearing where the inner race, outer race and rolling elements are made from the same

composition. Mitamura teaches (see paragraph spanning pages 19 and 20) that the steel is subjected to a high temperature tempering (at 240-550°C) in order to impart dimensional stability at high temperatures to the steel by reducing the amount of retained austenite to below 3 vol%.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the high temperature tempering step of Mitamura to the steel of Maeda et al because the tempering step improves the dimensional stability of a rolling bearing at higher operating temperatures and it would have been obvious to make a rolling bearing from the case hardening steel of Maeda et al because it has properties, such as high surface hardness after carburizing, that make it ideal for use as a rolling bearing. Because the high temperature tempering process of Mitamura provides it benefits by reducing the amount of retained austenite to below 3 vol%, one of ordinary skill in the art would have had a reasonable expectation of successfully applying the high temperature tempering to the steel of Maeda et al because the slightly different compositions would not affect the result of the austenite being transformed to martensite.

Regarding the claimed surface hardness, one of ordinary skill in the art would have expected the steel of Maeda et al in view of Ochi et al and Mitaura to have the hardness as claimed because it has an identical composition and is treated by an identical method.

Regarding claim 2, see table above regarding Mo and V content.

Regarding claim 3, the range of Mn+Ni taught by Maeda et al is 0.7-5.0 wt%. Thus, Maeda et al teach an overlapping range for Mn+Ni at 1.5-4.0 wt%. It would have been within the expected skill of a routineer in the art to have optimized the amount of Mn and Ni in the alloy of in order to maximize the hardenability and toughness (see Maeda et al at col. 4, lines 6-10 and lines 17-27).

Regarding claim 4, Maeda et al in view of Ochi et al teach preparing a steel having the claimed composition. Maeda et al teach (see figures 4B and 4C) performing carbonitriding followed by quenching and then tempering at 170°C. Maeda et al fails to meet the claimed range of the tempering process. Mitamura teaches (see paragraph spanning pages 19 and 20) that the steel is subjected to a high temperature tempering (at 240-550°C) in order to impart dimensional stability at high temperatures to the steel by reducing the amount of retained austenite to below 3 vol%. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the high temperature tempering step of Mitamura to the steel of Maeda et al in view of Ochi et al because the tempering step improves the dimensional stability of a rolling bearing at higher operating temperatures.

8. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al (US 5,595,610) in view of Ochi et al (EP 0933440) and Mitamura (GB 2,235,698) as applied to claims 1-4 above, and further in view of Maruta et al (US 4,885,905).

The teachings of Maeda et al in view of Ochi et al and Mitamura are described above in paragraph no. 7.

Maeda et al and Mitamura do not teach applying a secondary quenching step between the carburizing step and the tempering step.

Maruta et al teach (see col. 3, lines 59-64) applying secondary quenching to a bearing steel to increase hardness and improve abrasion resistance.

Therefore, it would have been obvious to one of ordinary skill to have performed a secondary quenching step before the tempering process in order to ensure proper hardness and to improve abrasion resistance.

Regarding claim 6, Maeda et al is silent on the secondary quenching. Though Maruta et al do not expressly teach that the secondary quenching is preceded by intermediate annealing, Maruta et al teach (see col. 3, lines 59-64) that the steel is quenched from 840°C. Thus, heating to 840°C would precede the quenching. This heating to 840°C would constitute intermediate annealing. Therefore, it would have been obvious to one of ordinary skill in the art to have performed intermediate annealing on the steel of Maeda et al because Maruta et al teach that the secondary quenching, which is preceded by the intermediate annealing, improves hardness and abrasion resistance.

Regarding claim 7, the range of Mn+Ni taught by Maeda et al is 0.7-5.0 wt%. Thus, Maeda et al teach an overlapping range for Mn+Ni at 1.5-4.0 wt%. It would have been within the expected skill of a routineer in the art to have optimized the amount of Mn and Ni in the alloy of in order to maximize the hardenability and toughness (see Maeda et al at col. 4, lines 6-10 and lines 17-27).

9. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi et al (EP 0933440) in view of Mitamura (GB 2,235,698).

Ochi et al teach (see abstract) a case hardening steel that has a composition which overlaps the presently claimed composition ranges.

	Claimed	Ochi et al	Overlap
C	0.1-0.4 wt%	0.1-0.4 wt%	At 0.1-0.4 wt%
Si	0.3-3.0 wt%	0.02-1.3 wt%	At 0.3-1.3 wt%
Mn	0.2-2.0 wt%	0.3-1.8 wt%	At 0.3-1.8 wt%
P	<0.03 wt%	<0.025 wt%	At <0.025 wt%
S	<0.03 wt%	0.001-0.15 wt%	At 0.001-0.03 wt%
Cr	0.3-2.5 wt%	0.4-1.8 wt%	At 0.4-1.8 wt%
Ni	0.1-2.0 wt%	0.1-3.5 wt%	At 0.1-2.0 wt%
Al	<0.05 wt%	0.015-0.04 wt%	At 0.015-0.04 wt%
Ti	<0.003 wt%	<0.01 wt%*	At <0.0025 wt%*
O	<0.0015 wt%	<0.0025 wt%**	At <0.0012 wt%**
N	<0.025 wt%	0.006-0.02 wt%	At 0.006-0.02 wt%
Mo	0.05-2.5 wt%	0.02-1.0 wt%	At 0.05-1.0 wt%
V	0.05-1.0 wt%	0.03-0.5 wt%	At 0.05-0.5 wt%

*Ochi et al provide (see paragraph 30) a desired range of <0.0025 wt% Ti.
**Ochi et al provide (see paragraph 31) a desired range of <0.0012 wt% O.

Ochi et al teach (see paragraph 61) that the method of production includes carburizing followed by quenching (water cooling).

The differences between the invention of Ochi et al and the present invention are that (1) Ochi et al do not teach a tempering step that occurs at temperatures of 250-350°C and (2) Ochi et al do not teach that the steel is made into a rolling bearing component having an inner ring, outer ring and a rolling element.

Mitamura teaches (see last 2 paragraphs on page 6 and 1st paragraph on page 7) a rolling bearing constituted of a bearing ring and a rolling element made from a steel with a composition similar to the steel of Maeda et al and that *at least one of* the races and rolling element is made from the steel. Thus, Mitamura teaches making a rolling

bearing where the inner race, outer race and rolling elements are made from the same composition. Mitamura teaches (see paragraph spanning pages 19 and 20) that the steel is subjected to a high temperature tempering (at 240-550°C) in order to impart dimensional stability at high temperatures to the steel by reducing the amount of retained austenite to below 3 vol%.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the high temperature tempering step of Mitamura to the steel of Ochi et al because the tempering step improves the dimensional stability of a rolling bearing at higher operating temperatures and it would have been obvious to make a rolling bearing from the case hardening steel of Ochi et al because it has properties, such as high surface hardness after carburizing, that make it ideal for use as a rolling bearing. Because the high temperature tempering process of Mitamura provides it benefits by reducing the amount of retained austenite to below 3 vol%, one of ordinary skill in the art would have had a reasonable expectation of successfully applying the high temperature tempering to the steel of Ochi et al because the slightly different compositions would not affect the result of the austenite being transformed to martensite.

Regarding the claimed surface hardness, one of ordinary skill in the art would have expected the steel of Ochi et al in view of Mitaura to have the hardness as claimed because it has an identical composition and is treated by an identical method.

Regarding claim 2, see table above regarding the presence of Mo and V.

Regarding claim 3, the range of Mn+Ni taught by Ochi et al is 0.4-5.3 wt%. Thus, Ochi et al teach an overlapping range for Mn+Ni at 1.5-4.0 wt%. It would have been within the expected skill of a routineer in the art to have optimized the amount of Mn and Ni in the alloy of in order to maximize the strength and hardenability (see Ochi et al at paragraphs 19 and 27).

Regarding claim 4, Ochi et al teach preparing a steel having the claimed composition. Ochi et al teach (see paragraph 61) performing carbonitriding followed by quenching. Ochi et al fail to teach a further tempering process. Mitamura teaches (see paragraph spanning pages 19 and 20) that the steel is subjected to a high temperature tempering (at 240-550°C) in order to impart dimensional stability at high temperatures to the steel by reducing the amount of retained austenite to below 3 vol%. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the high temperature tempering step of Mitamura to the steel of Ochi et al because the tempering step improves the dimensional stability of a rolling bearing at higher operating temperatures.

10. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi et al (EP 0933440) in view of Mitamura (GB 2,235,698) as applied to claims 1-4 above, and further in view of Maruta et al (US 4,885,905).

The teachings of Ochi et al in view of Mitamura are described above in paragraph no. 9.

Ochi et al and Mitamura do not teach applying a secondary quenching step between the carburizing step and the tempering step.

Maruta et al teach (see col. 3, lines 59-64) applying secondary quenching to a bearing steel to increase hardness and improve abrasion resistance.

Therefore, it would have been obvious to one of ordinary skill to have performed a secondary quenching step before the tempering process in order to ensure proper hardness and to improve abrasion resistance.

Regarding claim 6, Ochi et al is silent on the secondary quenching. Though Maruta et al do not expressly teach that the secondary quenching is preceded by intermediate annealing, Maruta et al teach (see col. 3, lines 59-64) that the steel is quenched from 840°C. Thus, heating to 840°C would precede the quenching. This heating to 840°C would constitute intermediate annealing. Therefore, it would have been obvious to one of ordinary skill in the art to have performed intermediate annealing on the steel of Ochi et al because Maruta et al teach that the secondary quenching, which is preceded by the intermediate annealing, improves hardness and abrasion resistance.

Regarding claim 7, the range of Mn+Ni taught by Ochi et al is 0.4-5.3 wt%. Thus, Ochi et al teach an overlapping range for Mn+Ni at 1.5-4.0 wt%. It would have been within the expected skill of a routineer in the art to have optimized the amount of Mn and Ni in the alloy of in order to maximize the strength and hardenability (see Ochi et al at paragraphs 19 and 27).

Response to Arguments

11. Applicant's arguments filed 29 August 2003 have been fully considered but they are not persuasive. Applicant has argued that:

a. Maeda fails to teach that each of the inner ring, outer ring and rolling element are formed from the same steel material;

b. The argument with respect to claim 4 regarding the tempering temperature is immaterial; and,

c. One of ordinary skill in the art would not have had a reasonable expectation of successfully applying the high temperature tempering of Mitamura to the steels of Maeda et al and Ochi et al.

In response to Applicant's first argument, Maeda teaches (see abstract) that *at least one of* the rolling element and bearing ring are made from the composition. Therefore, Maeda teaches making the rings and the rolling elements from the composition.

In response to Applicant's second argument, the argument presented in the previous rejection is material. The Examiner is relying on section I of MPEP 2144.05. Applicant's reference to section II is not material. While the prior art fails to meet the claimed temepratture. However, the claimed temperature range of 250-350°C would have been obvious to one of ordinary skill in the art because the prior art range is close enough, e.g.- 230 or 240°C vs. 250°C, that it would have been expected to have the same properties, see MPEP 2144.05.I and *Titanium Metals v. Banner*. Applicant has the burden to show that the claimed range is critical, thus producing different results. A difference of 10 or 20°C in a tempering treatment would not be expected by one of ordinary skill in the art to produce a critical difference. Even if it were required to show

that it was known that the variable was result-effective, it was known that the tempering temperature was result-effective, see, e.g., Mitamura in figure 5.

In response to Applicant's third argument, Mitamura teaches (see first paragraph on page 7) that the tempering occurs at 240-550°C. Mitamura teaches (see third paragraph on page 7) that the high temperature tempering is applied to reduce the content of retained austenite, which adversely affects the dimensional stability of the bearing. Mitamura teaches (see first full paragraph on page 8 and paragraph spanning pages 8 and 9) that the processing produces fine carbides of Cr, Mo and V, all of which are contained in the steel of Maeda et al and Ochi et al which increases the wear resistance of the part by increasing the hardness of the carburized/carbonitrided case. At the very least, the major difference in composition is the presence of Ni in the steels of Maeda et al and Ochi et al. However, both Maeda et al (see col. 4, lines 16-27) and Ochi et al (see paragraph 27) teach the Ni improves the hardenability of the alloy. Thus, one of ordinary skill in the art would have had a reasonable expectation of successfully using the high temperature tempering of Mitamura for the steels of Maeda et al and Ochi et al because the Cr, Mo and V carbides formed by the tempering treatment would still be formed, thus improving the dimensional stability and wear resistance as taught by Mitamura, and the Ni of Maeda et al and Ochi et al would further improve the hardness after tempering over and above the hardness retention after high temperature tempering in the alloy of Mitamura.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

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